

**The Real Salmon Farming Resistance, 21 March 2023**

**Growing Resistance Vs Land-Based Salmon Farming Spawns Protests  
- Aquacultured Seafood Ltd in England & Mowi, Scottish Sea Farms, Bakkafrøst, Cooke,  
AquaGen & Hendrix Genetics (Landcatch) in Scotland targeted**



Campaigners are gearing up for coordinated global action against land-based salmon farming during 2023. The [Real Salmon Farming Resistance](#) will be joining 'Big Wave 2' protestors in Cleethorpes on Sunday (26 March) to [flag up plans for the UK's largest salmon farm next to Grimsby Football Club](#) with protests planned at salmon farms across Scotland during May and June 2023 [1].

“Salmon farming is the spawn of the devil whether in the sea, freshwater or on land,” said Don Staniford, Global Director of the Real Salmon Farming Resistance. “Land-based salmon farms are a welfare nightmare and must be closed down to stop the suffering of millions of fish. [Gruesome video footage](#) has exposed how salmon farms are torture chambers with mass mortalities, infectious diseases, horrific welfare abuse and widespread use of toxic chemicals. Far from being a panacea for the evils of open net cages, salmon farming on land will only exacerbate problems. A public backlash against fish concentration camps will leave salmon farming dead in the water and lead to a global boycott of factory farmed salmon.”

“Salmon farms in Scotland are killing tens of millions of Atlantic salmon crammed in cages in sea lochs, freshwater lochs and in land-based tanks,” said Jamie Moyes, Scottish Director of the Real Salmon Farming Resistance. “I’ve worked as a salmon farmer and [seen at first hand the horrors of factory fish farming](#). If the general public witnessed the true costs of salmon farming then they would stop buying abused farmed salmon. Shame on the RSPCA for greenwashing the toxic and lethal salmon farming industry. Please join the Real Salmon Farming Resistance and give a voice for the millions of fish dying each year inside salmon farms. Fish are meant to be swimming in the wild not confined in cages on land!”

Land-based salmon farming is spreading like a malignant cancer all over the globe leaving a trail of mass mortalities, infectious diseases, pollution and welfare abuse in its wake:

Animal Outlook [lifted the lid on welfare abuse and poor practices inside a land-based salmon farm operated by Cooke Aquaculture in Maine in the United States in 2019:](#)



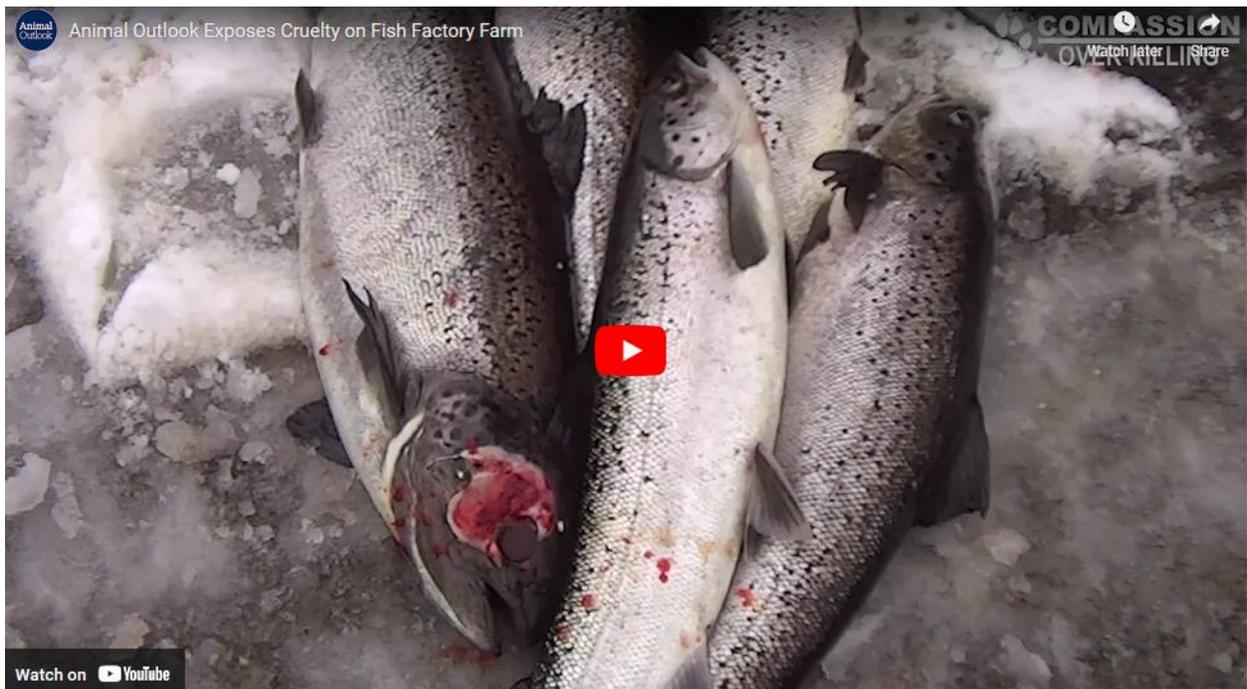
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## Aquaculture: A Sea of Suffering

In 2019, Animal Outlook released the first-ever undercover exposé of salmon aquaculture in the U.S.

Our investigator worked inside Cooke Aquaculture in Bingham, Maine, exposing senseless violence against these sentient animals at an industrial Atlantic salmon hatchery supplying Martha Stewart's new True North Seafood line.



The groundbreaking video takes you beneath the surface of fish factory farming and reveals putrid conditions, rampant disease and widespread cruelty to fish intensively crowded in barren tanks.

The plight of fish often goes unseen and unheard, but our new exposé brings to light the dire lack of protection for millions of animals raised for food.

In May 2019, BBC Countryfile [reported on Atlantic Sapphire's closed containment salmon farm in Denmark including criticism of land-based salmon farming by Compassion in World Farming](#):



### Inside Scottish Salmon Feedlots

January 30, 2020 · 🌐

Joe Crowley investigates whether "closed containment" farmed salmon could be one of the solutions to the problems caused by "open cage" salmon farming.

He visits a cutting edge "environmentally responsible" salmon farmer in Denmark, with a facility in the US set to produce 300,000 tonnes of salmon a year, nearly double Scotland's entire open cage salmon farm industry.

<https://atlanticsapphire.com>

<https://www.bbc.co.uk/programmes/m0004ptw>

Shown on THE ONE SHOW, BBC 1, 7pm. 1 May 2019

[#cleanuporclearout](#)



Closed Containment Salmon, The One Show, BBC 1, 7pm 1 May 2019

Read more via ['Fish tank' salmon on sale in Britain but critics slam 'factory farm' welfare standards and claim it causes animals stress](#)

Atlantic Sapphire's problems with land-based salmon farming in Denmark and the United States have been well-documented:

[Atlantic Sapphire reports "above normal and increasing" salmon mortalities](#)  
[Activists accuse Atlantic Sapphire of Animal Cruelty After 800,000 Salmon Die Prematurely](#)  
[A Florida fish farm destroyed 800,000 salmon. Did it break the law?: Animal-rights nonprofit](#)  
[Animal Outlook wants the authorities to investigate aquaculture giant Atlantic Sapphire](#)  
[Danish police say Atlantic Sapphire fire and chemical leak under control, but warn people away](#)  
[Atlantic Sapphire report all fish lost after fire](#)

Intrafish [reported in October 2022:](#)



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## Atlantic Sapphire revises revenues as increasing mortality plagues its land-based salmon production

The producer has had to harvest fish earlier than planned at its huge Miami Bluehouse.

17 October 2022 3:40 GMT UPDATED 17 October 2022 3:58 GMT

By [Raahel Mutter](#)

Above normal and increasing mortality in some of land-based salmon farmer Atlantic Sapphire's systems will result in reduced revenue expectations for the second half of 2022.

The company had expected a higher price achievement for its harvested fish in the second half of the year compared to the average realised price in the first half, but ongoing issues have led to early harvests and a lower average weight than originally planned.

The company's average harvest weight in the second half of 2022 is expected to be around 2 kilos head-on gutted.

While the company is still expected to receive an average premium price of around \$12 (€12.31) per kilo for its above 3 kilo salmon, the overall revenue for the second half is now expected to be around the same level as the first half.



**Founders of land-based farmer Atlantic Sapphire snap up conventional salmon farming licenses in Norway auction**

Atlantic Sapphire says it continues to investigate the cause of the mortalities with the aim of taking further corrective actions to minimize future mortalities.

The company is in the process of upgrading the farm infrastructure, including the intake water pre-cooling system, to ensure temperature stability and improved biological performance, it said in a release to the Oslo Stock Exchange Monday.

Intrafish [reported in February 2023](#):



## Here are the world's biggest land-based salmon farming projects

Investors are particularly keen on safe investments in times of uncertainty, making the current volatile economic outlook the sector's biggest challenge to date.

18 February 2023 5:00 GMT UPDATED 18 February 2023 14:51 GMT

By Hanne Gezelius 

In 2019, when **IntraFish** last compiled a list of the major -- or most visible, at least -- land-based salmon farming projects in the planning stage or in operation around the world, it was far from clear which projects were for real, and which ones were part of a mad scramble to take advantage of investor excitement.

Four years later, there has been lots of development and -- crucially-- significantly more investment. But there is still no clear answer to the question of whether land-based salmon farming will become a reliable and significant complement to traditional farming.

There has been significant progress and significant setbacks, but more companies are now producing and selling fish, demonstrating that it can be done, at least on a smaller scale.

Apart from a handful of smaller niche players around the world, Atlantic Sapphire, which is constructing a massive operation near Miami, Florida, is one of the few newcomers that have harvested meaningful volumes so far.



**'Investors are increasingly asking for proof': Can the land-based aquaculture sector find financing in a recession?**

[Read more](#)

While some farms are producing extremely low volumes, most are nowhere near shovel-ready, or are stuck hunting for financing.

### Reality versus dream

The first time Norway-based research firm Kontali included land-based salmon farming in its modelling tools as a specific category was in 2015. At that time, the firm projected all the known projects would account for a combined annual capacity of 150,000-200,000 metric tons globally.

Since then, this figure has notably increased, and by 2020 planned capacity amounted to 1.7 million metric tons. By early 2022, production was estimated at 2.2 million metric tons, according to Kontali Chief Analyst Ragnar Nystoyl.

That's grown even more, Nystoyl said.

"Currently, we see an annual communicated capacity that has surpassed 3 million metric tons globally," Nystoyl told **IntraFish**.

However, Kontali has also been looking at likely volumes to be produced as opposed to planned volumes, and this development is far more interesting.

In 2016, Kontali presented a harvest forecast for 2022 of some 30,000 metric tons, and 50,000 - 55,000 metric tons for 2025.

Currently, though 2022 numbers are not finalized, land-based farms are likely to produce no more than 12,000 -13,000 metric tons, while the 2025 estimate is now below 50,000 metric tons, Nystoyl said.

### **Ironing out the kinks**

Though production issues continue to plague Atlantic Sapphire, most others have reported improved growth and quality. In the past several months, no buyers have reported pushing back products due to taste issues or other quality problems.

Land-based farmers are working hard to avoid off-flavor in their fish, and the issue has the potential to become a non-issue as time goes on and new learnings are implemented. Other likely hiccups any new sector is likely to face, including technological, regulatory and safety problems, are also increasingly being addressed as companies learn from mistakes.

"The land-based industry is developing in the right direction, but it's still a long way -- and many, many years away -- from standardization and having the 'best practices' broadly available," Atlantic Sapphire CFO Karl Oystein Oyeaug told **IntraFish**.

"This goes for design, construction and operation of these facilities."



**Canada government report says significant land-based salmon production in BC 'at least' 10 years away**

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Nordea seafood analyst Herman Dahl agreed that the industry lacks a key advantage conventional salmon has.

"The sector does not benefit from significant collective learning as such as many of the farms differ and will therefore encounter specific problems related to them rather than the sector as a whole," Dahl told **IntraFish**.

Nonetheless, many companies are likely to have drawn on some learnings from the issues Atlantic Sapphire has faced, Dahl said.

"In five to 10 years, I'm sure the land-based sector will complement traditional salmon farming with substantial volumes," Dahl predicted.



**Ex-Nordic Aquafarms executives launch land-based salmon farming project in Maine**

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Oyeaug agreed.

"I think few people today doubt that it's possible to produce high-quality salmon on land and that it will become a significant part of the global salmon market, but it is becoming more and more clear that it will take time due to the technological complexity and long lead times," Oyeaug said.

### **About the 2023 List**

Below is a list of the main land-based salmon projects currently planned or already operating around the world, according to **IntraFish** research, including our own reporting, publicly available data, and input from experts including Kontali and the Freshwater Institute.

There are question marks around some of the projects, however, as updates are not always reported frequently. In addition, some of the projects lack contact information or other data allowing **IntraFish** to confirm any details. [Track our dedicated Land-Based Salmon page for news and updates on the projects.](#)

Company	Project Location	Projected capacity (metric tons)*	Status (Company estimates)
Andfjord Salmon	Norway	19,000	Andfjord released approximately 200,000 smolt into the company's first land-based pool at Kvalnes, Norway. The company expects to have market-sized fish to sell by mid-2023.
AquaBounty	United States	10,000	The stock-listed group began as a producer of genetically modified salmon eggs. Now operating two pilot sites in Canada and the US, and planning an additional site in Ohio. The company has been challenged by fundraising for the Ohio project. The company produced just over 122 metric tons of salmon from its facilities in 2022.
AquaCon	United States	45,000	The company is still seeking financing for its project, and recently scrapped its initial planned location for its Maryland project.
AquaCultured Seafood	United Kingdom	5,000	Backed by former Scottish Salmon Company CEO Craig Anderson and former M&J Seafood executive Mike Berthet, among others. Estimated cost of \$90 million. Planned for Grimsby, UK.
Aquagroup	Russia	5,000	Targeted completion date for project of 2024. No updates.
Aquaproduct	Russia	2,500	Company started construction of the farm in Russia's northwest Vologda region in July 2019, with a target of late 2022 production, but unclear if it met the goal. Partners with AquaMoaf.
Aquatrade	Russia	2,000	Major shareholder is Russian billionaire Andrei Katkov. Project scheduled to enter full operation in three stages, the first of which was planned to be completed in 2022, with the third to finish in 2023. No updates.
Arctic Ocean - Jutland Invest	Norway	30,000	Plans to build a land-based salmon facility dubbed Arctic Ocean in Kirkenes, Finnmark for NOK 3 billion (€310 million/\$346.8 million).
Arctic Seafarms	Norway	15,000	Plant is planned to be in full production with two modules in 2027.
Atlantic Salmon South Africa	South Africa	3,400	Atlantis West Coast Salmon Project, according to industry executive.
Atlantic Sapphire	United States	220,000	The most advanced and ambitious land-based salmon farming project. All eyes are on the Miami-based group, with expectations that its success or failure will dictate the future of multiple other projects.
Baring Farsund	Norway	24,000	Building was expected to start Q4 2022 with production beginning in Q2 2024.

Berliner Landlachs	Germany	5,000	
Blue Horizon Coho Farm	China	0	No available information.
Blue Star	Canada	100	Operates the Taste of BC steelhead farm in British Columbia. Its parent company also has a land-based crab unit.
Bolaks	Norway	12,000	Not sure if started building, focus on other seafood aspects.
Brumer Development	South Africa	0	No available information.
Bulandeet Miljofisk	Norway	0	No available information.
Cape D'or	Canada	225	No update on website or elsewhere found. Cape D'or is a successor to bankrupt Canaque run by Forrest Merlin. The company is producing in flow-through and partial reuse.
Cape Nor	South Africa	0	No available information.
Columbi Salmon	Belgium	20,000	Columbi Salmon is establishing a land-based salmon farming project in Oostende, Belgium. Over the coming years, the company plans to establish further production facilities throughout Europe and aims to produce 15,000-20,000 metric tons annually by 2024.
Danish Salmon	Denmark	3,000	Hirtshals-based group has operated at a loss, but investment by Marubeni and Nissui is expected to jump start operations.
EcoFish Circle	Norway	6,000	EcoFish Circle is the owner of Lista Laks which will be the group's salmon producer. In May 2022, Ecofish started operating a demo tank containing 4,000 smolt. It plans to start construction of a commercial-scale farm in 2022 that it expects will be operational in 2024.
Fish Farm UAE	United Arab Emirates	0	No available information.
Fishbase Group	Norway	2,000	The company uses both RAS and Flow-through technology.
FishFrom	United Kingdom	3,000	Co-founded by former Salmobreed and Pan Fish MD Odd Geir Oddsen.
Geo Salmo	Iceland	24,000	The project, based in Thorlakshofn, has secured licenses, and expects construction to start in the second quarter. Phase 1 will be up and running by 2026 with around 7,500 tons production. The company is raising funds, but is backed by Bull Hill Capital, an Icelandic private investment company.

Gigante Salmon	Norway	13,700	Gigante's first salmon smolt will be released into its facility in Rodoy, Norway, in the autumn of 2023. The company plans to have its first fish ready for market in 2024. It recently signed a three-year agreement with feed giant Skretting.
Greenaquanor	Norway	90,000	Greenaquanor is seeking local government permits to build a land-based salmon and trout facility in Norway's Balsfjord municipality.
Havlandet	Norway	10,000	The company, owned by INC Gruppen, has built land-based production facilities for salmon next to INC Gruppen's existing cod and ballan wrasse facilities in Florø, Norway. The first salmon were placed in fish tanks in February 2021 and harvested in October 2021, the company said. After the success of its first harvest, Havlandet has plans to build a large-scale facility with a capacity for 10,000 ton capacity.
Helgeland Miljøfisk	Norway	0	No available information.
Hjelvik Matfisk	Norway	2,000	First commercial harvest expected of up to 250 tons expected in winter of 2023, company told LandbasedAQ.com
Jurassic Salmon	Poland	1,000	In production with small volumes sold into domestic market.
Kfarms (Salmon Evolution and Dongwon)	South Korea	8,400	Backed by Korean giant Dongwon, the group will begin construction of its South Korean \$154 million (€149 million) facility in 2023.
Katahdin Salmon	United States	5,000	Newly launched by the ex-top executives at Nordic Aquafarms Inc., the \$120 million project is slated for Maine.
Kobbevik og Furuholmen	Norway	10,000	According to industry executive, the Norwegian Food Safety Authority rejected the company's application to build the plant, but the company has appealed.
Kotoura Grand Salmon	Japan	600	Kotoura Grand Salmon in Japan's Tottori Prefecture is planning to raise coho salmon.
Kuterra	Canada	260	Kuterra, which opened in 2013 in British Columbia, is one of the longest-running land-based facilities to date growing salmon. The company is owned by Emergent Holdings, which also owns fledgling land-based salmon farmer Whole Oceans in Maine. It is unclear how much salmon Kuterra is currently producing.
Landeldi	Iceland	33,500	Expects its first harvest to take place mid-2023. It is aiming for a harvest of 4,000-5,000 metric tons in 2024. Company is funded for 3,000 metric tons of annual production, but expects to raise additional funds by late 2023.

LocalCoho / Finger Lakes Fish	United States	350	Selling small volumes, planning expansion. New backing from Peter Pan Seafoods CEO Rodger May.
Lofoten Salmon	Norway	NaN	No visible updates since 2020.
Losna Seafood	Norway	50,000	In 2022, Losna won a court case against the state regarding permits for land-based farming.
Maiken Food	Portugal	6,000	Projected construction start date of 2022. No updates.
Mt. Cook Alpine	New Zealand	1,000	A prototype for New Zealand's first sustainable, land-based salmon farm is in the early stages of development, with backing from the NZ government.
Norcantabric	Spain	10,000	Harvest projected by 2023.
Nordic Aqua Partners	China	40,000	Plans to harvest and sell to the Chinese market in late 2024. The existing land area has a potential to accommodate an annual production capacity of 16,000 tons, but expansion is planned.
Nordic Aquafarms California	United States	27,000	No listed start date. Primary group in Norway and Denmark shifted to kingfish production. Nordic Aquafarms Group continues to pursue projects in US.
Nordic Aquafarms Maine	United States	33,000	Construction to start in 2023. Primary group in Norway and Denmark shifted to kingfish production. Nordic Aquafarms Group continues to pursue projects in US.
Nordic Salmon	Sweden	0	No available information.
Norsal	China	30,000	Signed a contract with engineering consultancy Multiconsult for construction in Yantai, China.
Norwegian Seafarming	Norway	12,500	In 2021, the company applied for a 12,500 metric ton facility in Tysvaer municipality. No updates or website found.
Ocean Farm Holding	Norway	0	In Jan 2022, the municipality gave the company green light to start.
Ocean Harvest	United Arab Emirates	0	Not yet started to actively fundraise as its is waiting for a final price for the project.
OFS Norge	Norway	15,000	The project will be realised in 3 phases with a plan to reach full scale within 2026.
Proximar Seafoods	Japan	6,300	The facility is under construction and is expected to be completed in 2023. It is expected to be serving salmon to Japanese consumers from 2024. According to the company, civil works are 80% complete.
Pure Salmon	Brunei	10,000	Production: 5,000 metric tons annually with the capability to produce 10,000 tons a year.

Pure Salmon	France	10,000	If completed, site will be the largest land-based salmon facility in the European Union to date. First harvest of full-grown salmon expected in 2023.
Pure Salmon China	China	100,000	8F has said production will be spread across five facilities producing 20,000 metric tons each.
Pure Salmon Japan	Japan	10,000	Located in Tsu, Mie Prefecture in central Japan. Unclear production to date.
Pure Salmon Leshoto	Lesotho	20,000	Plans to build a land-based salmon farm in Lesotho, South Africa at a cost of \$250 million. The project's plan is expected to be finalized in 2023.
Pure Salmon Virginia	United States	1,000	Part of the 8F-backed Pure Salmon string of projects.
Quality Salmon	Sweden	100,000	No website up and running for a while, and no real updates to be found. The company had plans to build Europe largest land-based facility. Lots of local opposition, a fine and issues with Swedish tax regulations.
Salfjord	Norway	35,000	Land plot is under development, and large volumes of rock will be excavated before construction starts.
Salmo Terra	Norway	8,000	Press release says it will start producing 2023, but no new updates
Salmofarms	Norway	10,000	In 2018, the company announced it was currently building the farm in Telemark, Norway. Completely expanded, farm will have an annual production capacity of 10,000 tons. Its CEO left the company in 2019, and its status is unclear.
Salmon Evolution	Norway	100,000	Completed its first harvest of RAS-grown salmon at its Norwegian facility in November 2022. It is planning to start construction of its South Korean facility in 2023 and is scouting for a site in North America.
Samherji	Iceland	40,000	Samherji completed a share capital increase of \$26 million to build a pilot project in Oxarfjordur, Iceland, as well as for the design and construction of a 40,000-metric-ton farm in the Resource Park at Reykjanesvirkjun.
Shandong Ocean Oriental	China	0	No available information.
Skagen Aquaculture	Denmark	3,000	First salmon ready for market in 2023.
Smart Salmon Holding	France	8,000	Expect to start groundwork in the first quarter of 2024. Also has a Smart Salmon Norwegian division.
Smart Salmon Holding	Norway	7,500	Bids for groundwork during 2022. Stage one is a 2.500 tonnes post-smolt facility with construction starting already in autumn 2021. This first stage is low risk and yet profitable. Stage two is a 5,000 tonnes facility with a flexible solution of producing both post-smolt and full-grown salmon on-site, depending on the market's demand. Also has a French division.

Smogenlax	Sweden	2,000	Smolt delivered summer 2022.
Superior Fresh	United States	780	Company is reportedly at full capacity looking to expand on the West Coast.
Sustainable Blue	Canada	1,000	Company is reportedly a testing site for S2G Ventures-backed ReelData AI, according to industry executive.
Swiss Blue Salmon	Switzerland	0	No available information.
Swisslachs	Switzerland	600	In 2019, Swisslachs harvested 300 metric tons. Actively seeking funds for expansion.
Tianjing Changjiufada	China	0	No available information.
Tomren Fish	Norway	10,000	Expected to start building in 2022, according to local news.
Upstream Salmon	South Africa	0	Some company filings with 2022 updates, but very little information.
Viking Aqua	Norway	33,000	First fish will be in the tank in 2023.
Vikings Label	Saudi Arabia	50,000	Founded in 2017. Company plans to expand up to 50,000 mt per year production. Unclear how much of production will be solely salmon, however.
West Coast Salmon	United States	14,000	Expected to commence early site works in 2022 after concluding its construction financing. Backed by Nutreco, American Seafoods investor Bregal Partners, along with former Aker exec Hallvard Muri, former Icicle Seafoods CEO and former High Liner CEO.
Whole Oceans	United States	20,000	In 2022, the company said it is moving forward with site preparation work after delays, but has experienced multiple personnel changes and lack of financing.
Wild Coast Salmon	South Africa	NaN	No available information.
World Heritage Salmon	Norway	100,000	Backed by Norway's Roger Hofseth.
Xcelerate Aqua	United States	10,000	Founded in 2022 by former Nordic Aquafarms execs. Permits are in place for a Maine site.
Xinjinang E'he	China	0	No available information.

## Small towns and land-based salmon farms don't seem to be mixing very well

Everything in a small town is personal.

30 September 2022 5:31 GMT UPDATED 30 September 2022 13:38 GMT  
By John Fiorillo 

Another day, another skeptical mob of residents confronts a would-be land-based US salmon farmer at a town meeting. This story continues to repeat itself in small towns where these new-age salmon farmers are hoping to establish operations.

Small towns are protective. I live in a small town, and nothing that happens goes unnoticed. If the guy down the road moves his chicken coop from one side of the yard to the other, the neighborhood social media page lights up with questions about why he did what he did.



**Maryland residents dissect AquaCon's land-based salmon plans in heated town meeting**

[Read more](#)



**Russia may block salmon exports after wild season ends with record-low catches**

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If sirens are heard, the page explodes with details about what is happening. If a store goes out of business there is endless debate on what new business should take its place.

Everything in a small town is personal.

And it is for this reason that salmon farmers are struggling to convince residents in these towns to climb aboard the land-based salmon farming train.

To farm fish, whether on land or in the sea, one thing is needed above all else: water. And in small towns water is one of those key resources that everyone cares about because it affects most aspects of their lives.

Last week, more than 100 residents spent several hours discussing plans for a \$300 million (€312 million) land-based salmon farm proposed in the small town of Federalsburg, Maryland -- population 3,000.

AquaCon, spearheaded by a team of Norwegian aquaculture executives, chose Federalsburg because it sits on the state's Coastal Plain aquifer, which offers access to

significant fresh water.

The company has a production volume target of 50,000 metric tons of salmon that will be phased in over six years and with three phases each with around 16,000 tons of annual production.

If it ever gets built.

Things appeared to be moving along until last week's town meeting. In August, The Maryland Department of the Environment (MDE) issued a tentative permit to allow AquaCon to discharge up to 2.3 million gallons a day of treated "purge" water into Marshyhope Creek, a tributary of the state's Nanticoke River.



**From teacher training to the shelves of Whole Foods, this salmon farming boss found his calling**

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Even if the company ultimately secures the discharge permit, there are other permits -- several that the town itself has control over -- that must be obtained. And as was demonstrated at the meeting, the process of drawing fresh water into the facility from the town's aquifer remains a big concern.

AquaCon's challenges are just the latest in a string of similar hurdles faced by land-based farmers in small towns in Maine and elsewhere. To date, four US companies in Maine have yet to produce any salmon after years of investment and promises made to local and state

[officials and residents.](#)

These farms, too, are battling complicated permitting processes and pushback from residents.

And as more of these battles unfold in small towns a perception begins to develop, grow and spread -- the perception that land-based salmon farming is not compatible with small-town sensibilities.

An investor looking to sink his or her money into a company in the fledgling US land-based salmon farming sector should pay careful attention to the company's understanding of the local community.

In the end that might be the single most defining aspect of all of these projects.

Intrafish [reported in May 2021](#):

## No, land-based salmon farming doesn't get a free sustainability pass

The NGO community helped light the fuse for the land-based aquaculture explosion. But the industry is all on its own now.

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5 October 2020 2:38 GMT

#### Entrepreneur scraps plans for massive land-based salmon farming project

Salmon  
5 June 2020 9:47 GMT

28 May 2021 5:30 GMT    UPDATED 27 May 2021 13:28 GMT

By Drew Cherry 

This month will be known as the first time the land-based salmon farming industry got a taste of how ugly and complicated opposition can look.

Atlantic Sapphire, the most advanced land-based salmon farming operation so far, with commercial production in Denmark and the United States, [found itself in the crosshairs](#) of animal rights activist group Animal Outlook for a range of alleged animal welfare violations for a die-off of 500,000 fish earlier in the year.

The group, which went after Cooke Aquaculture in 2019, filed a lawsuit calling for hefty fines and jail time for the CEO.

The complaint won't amount to anything, but it had the intended effect of drawing media attention, taking up management resources and further advancing the idea that aquaculture is not a sustainable industry.

This weekend another land-based salmon farming project, Maine-based Nordic Aquafarms USA (which had already been facing some local opposition over potential environmental impacts), [had its offices defaced with graffiti](#), including the word "pollutes."

First, I want to be crystal clear: the people that vandalized Nordic Aquafarms offices are not environmentalists. However, they were either opposed to the project or inspired by opponents of the project, and felt that the perceived environmental impacts of the project entitled them to break the law.

The irony here, of course, is that the fuse for the land-based boom we are seeing today was lit by environmentalists.

For years, land-based salmon farming was the darling of NGOs, who argued salmon farming could be moved on land with great commercial results and none of the environmental impacts.

It was a compelling pitch: No escapes. No sea lice. No impact on wild salmon. No concerns about feed waste or effluent impact on sea floors.

But apart from the early championing of small projects -- [some that no longer exist](#) or [have dramatically scaled back ambitions](#) -- there's been a deafening silence from the NGO community since the sector began to attract real money and show the promise of making a significant contribution to the world's farmed salmon supply.

And there certainly hasn't been a peep from any NGOs that once championed the sector when projects have run afoul of local communities or animal rights activists.



**LETTER: Land-based salmon farming explosion came from years of hard work, not NGOs' blessing**

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The sustainability pitch is central to the selling point for land-based salmon, and the potential growth of the industry is built in large part on the notion that companies are selling salmon without the guilt.

The trouble with *land-based* salmon farming, though, is that it's, well, *land-based*. That means it's a farm, just like any other farm, be it pork, cattle, poultry or lamb.

So it will face scrutiny for all the same things -- impacts on the surrounding environment, energy consumption, land and water use, worker treatment and animal welfare issues.

If land-based aquaculture companies thought they'd get a free sustainability pass from NGOs, it's pretty clear now that they won't.

Data [published by the Scottish Government in October 2022](#) reveals how tens of millions of farmed salmon are being killed during the land-based phase of production in Scotland (in 2021, 74 freshwater salmon farms produced 51.2 million fish from 72.8 million ova):

**Table 18:** Source, number (000's), previous year's estimate of ova laid down to hatch during 2012-2021 and projected production for 2022

Year	In-house broodstock	Out-sourced GB broodstock	GB wild broodstock	Foreign ova	Total	Previous year's estimate
2012	18,556	9,981	0	34,700	63,237	55,723
2013	16,996	8,263	0	41,315	66,573	49,249
2014	14,418	2,725	10	53,684	70,837	48,149
2015	6,479	223	10	61,463	68,175	65,284
2016	5,884	4	0	58,458	64,346	59,604
2017	6,228	360	0	59,158	65,746	60,673
2018	8,780	200	0	61,499	70,479	67,374
2019	5,516	1,724	75	63,931	71,246	71,571
2020	5,195	4,480	258	68,685	78,618	70,598
2021	6,383	22,581	124	43,707	72,795	68,588
2022						77,306

The number of ova laid down to hatch was 72.8 million, a decrease of 5.8 million (7%) on the 2020 figure. The majority of the ova (60%) were derived from foreign sources, this being a decrease of 25 million (36%) on the 2020 figure. Supplies derived from GB broodstock (excluding wild origin ova) increased by 19.3 million, a 199% increase on the 2020 figure. In 2021, 124,000 ova from GB wild broodstock were laid down to hatch, ova derived from wild stocks are generally held and hatched for wild stock enhancement by the aquaculture industry in cooperation with wild fisheries managers.

### Smolts Produced and Put to Sea

**Table 19:** Actual and projected smolt production and smolts put to sea (millions) during 2012-2023

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Actual smolts put to sea	41.1	40.9	48.1	45.5	43.0	46.1	45.5	53.0	52.5	51.1		
Smolts produced	44.3	40.5	45.0	44.6	42.9	46.2	47.1	51.4	50.5	51.2		
Estimated production	31.3	28.1	39.9	43.4	36.6	39.3	46.1	38.6	52.1	55.6	54.1	55.6
Ratio of ova laid down to smolts produced	1.4	1.6	1.6	1.5	1.5	1.4	1.5	1.4	1.6	1.4		

The figure for the number of smolts put to sea includes smolts produced in England and smolts imported from elsewhere, whereas smolt production data relate only to those produced in Scotland. Smolt producers estimate putting 54.1 million smolts to sea in 2022. The ratio of ova laid down to hatch to smolts produced in 2021 was less than the ratio in 2020.

Mortality data published [published by the Scottish Government’s Fish Health Inspectorate on 8 March 2023](#) reveals over 14 million dead salmon reported at land-based salmon farms since 2015 via 134 ‘Mortality Event Reports’. Here are the largest reported mass mortalities – headed by Bakkafrost (The Scottish Salmon Company) and Mowi (Marine Harvest):

Mortality Event No	Business Name	Site Name	Date reported	Size of fish	Mort %	Explained reasons	Mort #s	Additional information
MRT03186	The Scottish Salmon Co	Applecross Hatchery	05/09/2022	1st feed to 5g	53.33	Water Quality	1576522	
MRT00964	Mowi Scotland Ltd	Lochailort Recirculation Hatchery	23/03/2019	Egg to 1st feed	50	Human error	1521479	All alevins in one of the hatcheries lost (2019 Q4 generation). Human error resulting in recirculation pump stopping. Other stocks on site unaffected (2019 Q3 parr and another batch of 1.5 million 2019 Q4 alevins in separate hatchery). Percentage loss across the whole site for w/b 18/3/19 is 28.54%, but 49.81% in Q4 generation
MRT03650	Bakkafrost Scotland	Couldoran Incubation Unit	19/12/2022	Egg to 1st feed	80	Stock Incident - inlet pipe became blocked and created a vortex, which supersaturated the comp hatch water.	1159752	Remaining alevins culled as compromised with gas bubbles.
MRT00744	Marine Harvest (Scotlar	Inchmore	21/08/2018	5g to smolting	28	Oxygen supply failure	520171	Attempting to get in contact with company
MRT03758	Mowi Scotland Ltd	Inchmore	20/01/2023	Egg to 1st feed	10.51	Unviable Eggs	455358	
MRT00256	Cooke Aquaculture (Fre	Furnace (FW)	21/06/2017	1st feed to 5g	46.8	Salmon gill pox	444787	Samples sent to FVG and test own samples. Administering formalin (mortalities from 14/6/17-20/6/17)
MRT02893	Mowi Scotland Ltd	Inchmore	15/03/2022	<750g	6.65	Unviable Eggs & Alvin / Hatch Fail	415707	Mortality was caused by egg quality issues, a lot of stress hatching occurred once the eggs arrived which resulted in increased fungus pressure resulting in
MRT02826	The Scottish Salmon Co	Applecross Smolt Unit	31/01/2022	5g to Smolting	52.77	Stock Incident	408892	Systemic investigation ongoing
MRT00068	Cooke Aquaculture	Furnace (FW)	08/03/2016	1st feed to 5g	10.81	RTFS	331235	Samples sent to FVG - diagnosed RTFS. Treated with Florfenicol - not totally effective but morts reduced. Now starting treatment with Braznil.
MRT02219	Mowi Scotland Ltd	Inchmore	13/07/2021	5g to smolting	11.22	Hydrogen sulfide (H2S) issue	317068	
MRT02920	Mowi Scotland Ltd	Inchmore	14/04/2022	Egg to 1st feed	4.04	Unviable Eggs & Alvin / Hatch Fail	295959	
MRT02074	The Scottish Salmon Co	Geocrab Hatchery	01/03/2021	Egg to 1st feed	18.94	Stock Incident - extreme cold resulted in water inlet freezing, heated water increased temperature within comp hatch	284083	no ongoing mortality issues
MRT02856	Mowi Scotland Ltd	Inchmore	17/02/2022	Egg to 1st Feed	9.14	Unviable eggs & Alvin/ Hatch Mortalities	274496	
MRT00697	Lakeland (Cairndow)	Cairndow Hatchery	10/07/2018	1st feed to 5g and 5g to smolting	2.2	Poor water quality and high water temperatures	272000	Lack of rainfall caused lack of fw on site, resulting in re using water in a system not purpose built for recirc. Moved ~750k fish off site to reduce the amount of water having to be reused. Inspected by operators health team wk beg wk 28 and fish are looking much better. Rain forecast and hope to completely stop reusing water this week. Expected to fall back below reporting levels this week.
MRT02267	Grieg Seafood Shetland	Girlsta Hatchery	19/07/2021	5g to smolting	5.25	Oxygen delivery cabinet caught fire	267165	
MRT02926	Mowi Scotland Ltd	Inchmore	20/04/2022	Egg to 1st feed	3.79	Unviable Eggs & Alvin / Hatch Morts	266768	Update of other mortality at Inchmore: 1st feeding to 5g, 0.37%, 9445, poor performers; 5g and over, 0.33%, 2917, background mortality
MRT00066	Sunbeam Aquaculture L	Kinlochmoidart Hatchery	29/02/2016	Egg to 1st feed	77.71	Power cut	224047	Alarm line used to be tested weekly, now tested daily. Potential for 24hr staff on site.
MRT02879	Mowi Scotland Ltd	Lochailort Recirculation Hatchery	03/03/2022	Egg to 1st feed	6.11	Unviable eggs/alvin - Hatch mortalities	192992	Business correspondent contacted - Bad batch of eggs that have not been hatching well. This is a problem across the board. Additional mortalities have been heavier than usual. This is expected to drop down as hatching continues
MRT00684	Scottish Sea Farms Ltd	Knock	27/06/2018	1st feed to 5g	13.12	Stress induced by high temperature	177275	Transfer of fish to larger tanks to reduce stocking density. Oxygen increased
MRT00651	Cooke Aquaculture (Fre	Furnace (FW)	12/06/2018	5g to smolting	11.67	PD	163135	Site suspected IPN. Temperature had been increased to try and kill of the virus. From diagnostic (2018-0214) SAV positive result (subtype 1).

MRT01531	Cooke Aquaculture (Fre Cairndow Hatchery	05/02/2020	1st feed to 5g	5.2	Water quality and fungus	156196	High morts in spring 2019, poor water quality resulting in morts attributed to fungus and lesion only in C section.
MRT00011	Cooke Aquaculture ScotQuoys Hatchery	04/08/2015	<750g	40	Algal bloom	156000	~40% in pre smolt. Unspecified in fry/parr
MRT00911	Cooke Aquaculture ScotQuoys Hatchery	28/01/2019	Egg to 1st feed	32.4	environmental insult/fungus	142803	Samples taken by vets showed evidence of environmental insult on gills and fungus. Water looked clean, filtration increased and treated with Chloramin T. Mortality rate decreased in week 4 (calling back with figures)
MRT00065	Sunbeam Aquaculture L Kinlochmoidart Hatchery	29/02/2016	5g to smolting	39.09	Power cut	140886	Alarm line used to be tested weekly, now tested daily. Potential for 24hr staff on site.
MRT02842	The Scottish Salmon Co Applecross Smolt Unit	07/02/2022	5g to smolting	29.62	Stock Incident	135401	Systemic investigation ongoing
MRT01532	Cooke Aquaculture (Fre Cairndow Hatchery	05/02/2020	1st feed to 5g	5.3	Water quality and fungus	133416	High morts in spring 2019, poor water quality resulting in morts attributed to fungus and lesion only in C section.
MRT00694	Lakeland (Cairndow) Ltc Cairndow Hatchery	10/07/2018	1st feed to 5g and 5g to smolting	4	Poor water quality and high water temperatures	131000	Lack of rainfall caused lack of fw on site, resulting in re using water in a system not purpose built for recirc.
MRT00144	Grieg Seafood Shetland Girlsta Hatchery	07/11/2016	5g to smolting	3.29	Fungus	122225	Company biologists attended affected tanks, salt added to water, mortalities dropped down the following week.
MRT02177	Mowi Scotland Ltd Inchmore	21/06/2021	5g to smolting	7.35	Fish died consequently to lack of oxygen in just 1 tank during shallowing for grading	117908	Isolated incident mortality level in remaining fish of same intake is low
MRT00258	Cooke Aquaculture (Fre Furnace (FW)	21/06/2017	1st feed to 5g	21	Salmon gill pox	114842	Administered formalin

However, not all mortalities in freshwater (and seawater) are reported [as the Scottish Government explains:](#)

The following limitations must be considered in relation to the published information:

- the information presented is not a comprehensive record of fish farm mortality but only details situations where the mortality reporting thresholds have been reached and where this information has been reported to Marine Scotland by the industry or where information has been obtained through FHI surveillance

#### FARMED FISH MORTALITY EVENT – NOTIFICATION FORM GUIDANCE

##### Reporting criteria

The Healthier Fish Working Group recommended in August 2010 that extraordinary mortality events be reported to Marine Scotland Fish Health Inspectorate. This recommendation was accepted by industry and reporting criteria for Atlantic salmon have now been adopted into the Code of Good Practice for Scottish Finfish Aquaculture (from 2015) as detailed below.

Site Average Weight	Weekly Mortality Maxima	5 Weekly Rolling Mortality Maxima	Species\ Water type
<750g	1.50%	6%	A. salmon\ SW
>750g	1.00%	4%	A. salmon\ SW
Egg to 1st feed	6.00%	N/A	A. salmon\ FW
1st feed to 5g	3.00%	N/A	A. salmon\ FW
5g to smolting	1.50%	N/A	A. salmon\ FW

In October 2018, [The Sunday Mail reported](#) that 500,000 farmed salmon had died at Mowi's flagship hatchery at Inchmore - [opened only a few months earlier by Scotland's Cabinet Secretary for Rural Economy, Fergus Ewing](#).



In January 2022, a [whistleblower with a relative working inside the Applecross/Russel Burn land-based salmon farm operated by Bakka Frost Scotland \(The Scottish Salmon Company\) in Kishorn reported mass mortalities and welfare problems:](#)

 **Don Staniford**  
@TheGAATA

A whistleblower told Scottish Salmon Watch in January that 600,000 farmed salmon had died in a welfare disaster @salmon\_scottish's Applecross Hatchery - today @marinescotland reported 715,592 farmed salmon had died with a "systemic investigation ongoing"! [tinyurl.com/5n6s2us7](https://tinyurl.com/5n6s2us7)



6:51 PM · Mar 7, 2022

Land-based salmon farming does not eliminate the use of toxic chemicals. Intrafish [reported in October 2022](#):

**IntraFish** Latest News Salmon Whitefish Shrimp Aquaculture Fisheries Markets IntraFish.no

## Norwegian land-based salmon farming facility forced to use sea lice treatment

The fish received emamectin benzoate in the feed, according to fish health service Barentswatch.

18 October 2022 8:01 GMT UPDATED 18 October 2022 11:28 GMT  
By Hanna Gezelius and Anders Furuset

Norwegian land-based salmon farmer Andfjord was forced to chemically treat salmon in its flow-through plant in northern Norway for sea lice, according to ocean health monitoring agency Barentswatch.

Andfjord treated its fish with emamectin benzoate for two weeks via feed in August, the agency reported.

Emamectin benzoate is the active ingredient in the medicine known as Slice, manufactured by MSD Animal Health. The medicine is added to feed and kills lice, typically the *Lepeophtheirus salmonis* species that plagues the salmon farming industry.

"The company has not had salmon lice at the facility, but the treatment was due to sea lice," Andfjord Salmon General Manager Martin Rasmussen told **IntraFish** the treatment was not, however, for the larger species of salmon lice, but a smaller cousin that are typically on North Atlantic wild fish species.

**IntraFish** sister publication *Fiskeribladet* reported smaller sea lice growing problem in northern Norway for wild fish.

The financial impact from sea lice on the global salmon farming industry, meanwhile, is estimated to run between \$600 million (€600 million) and \$1 billion (€1 billion) annually, according to IntraFish estimates.

Aquaculture Land-based salmon Farmed salmon Sea lice  
Norway Land-based salmon Andfjord Salmon

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**Atlantic Sapphire's shares sink to historic low as investors get spooked by high mortality at land-based salmon operation**

The use of the carcinogenic chemical Formaldehyde (Formalin) – used by Damien Hirst to pickle his art exhibits in and used by morgues to embalm corpses – is [widely used in land-based salmon farms and hatcheries in Scotland](#).



In 2020, Scottish Salmon Watch [published gruesome photos shot by the Scottish Government's Fish Health Inspectorate](#) inside the Hendrix Genetics (Landcatch) [virus-laden land-based salmon farm at Ormsary in Argyll](#):



**Don Staniford**

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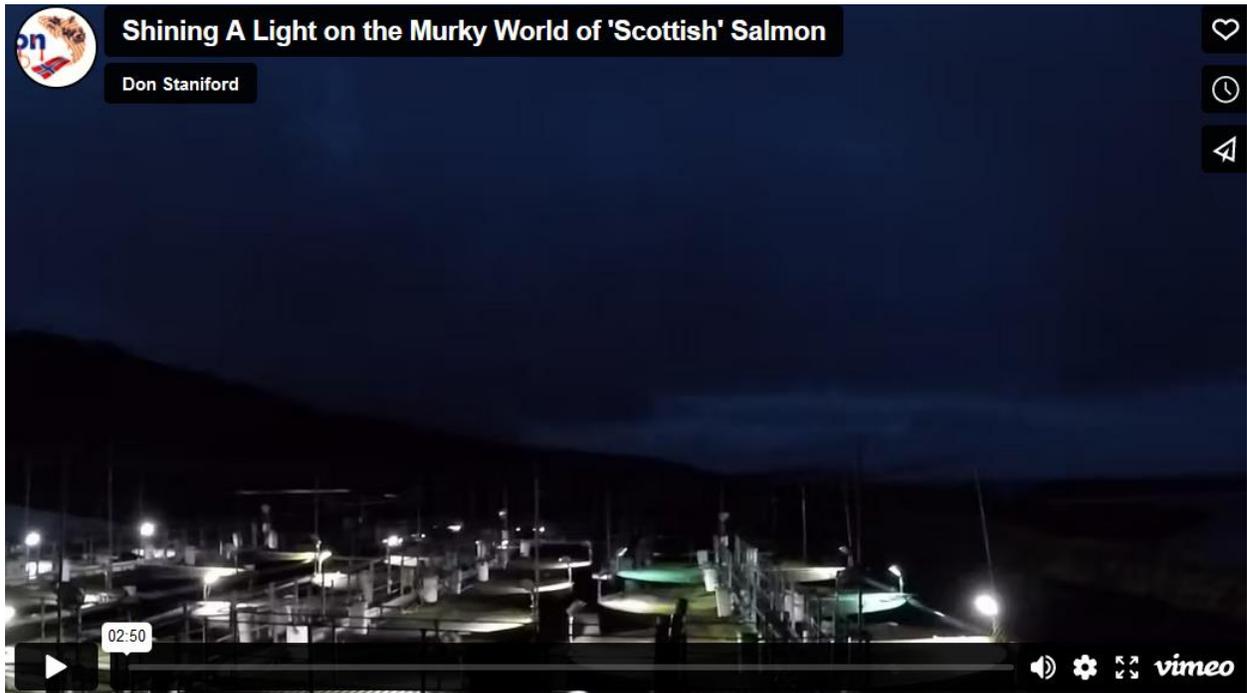
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6:55 PM · Apr 6, 2020



In March 2019, Scottish Salmon Watch [visited the Hendrix Genetics \(Landcatch\) land-based salmon farm at Ormsary:](#)



In March 2019, Scottish Salmon Watch [visited AquaGen's land-based Hollywood salmon farm in Dumfries:](#)



“Getting it right can be tricky,” [reported Science in February 2023](#) in an article showcasing land-based salmon farming and Atlantic Sapphire in particular. “In 2021, about 500,000 salmon died at the Florida facility after a clogged drain increased turbidity that may have generated deadly gases. The company’s output that year was just 2400 tons, far short of its long-range target. Other companies have faced protests over plans to build salmon farms in Maine and California. Some communities fear the farms will deplete precious groundwater, or pollute aquifers or surface waters with their waste. In Maryland, one firm canceled plans to build a farm after scientists said its wastewater could harm endangered sturgeon.”

“For oceangoing fish confined to tanks, stress is a constant risk, especially when they are handled. “When the fish don’t want to be moved, they can really hurt themselves,” says Åsa Maria Espmark, an aquaculture researcher with Nofima, the Norwegian food research institute ([as quoted by Science](#)).

“The Bluehouse project has not been all plain sailing,” [reported BBC News in April 2021](#). “In July last year an issue with its water quality meant that, in the words of Mr Andreassen, “we faced a situation where we risked large [salmon] mortalities”. To avoid this outcome, the company [decided to “emergency harvest” 200,000 fish before they had reached their full 20-month-old maturity](#). Another design problem in March this year caused further fish deaths, [the firm had to report](#). And earlier this month it was reported that three workers at the facility [had to go to hospital for treatment following the release of an unknown gas](#).”

“Unsurprisingly, animal rights group People for the Ethical Treatment of Animals (Peta) is damning of Bluehouse and the 40 or so other firms developing such land-based fish farms around the world,” [continued BBC News](#). “These include a planned barramundi farm in Arizona. “Fish farms [whether at sea, or on land] are pits of filth,” says Dawn Carr, Peta’s director of vegan corporate projects. “Fish are not fish fingers with fins, waiting to be cut apart, but feeling, thinking individuals capable of joy and pain, and they belong to themselves, not to humans. “Raising fish this way is wretchedly cruel and certainly unnecessary.”



Local residents in Cleethorpes have already mounted protests against a [proposed 5,000 tonne salmon farm next to Grimsby Football Club](#) which, if approved, would be the UK's largest (the largest salmon farm in Scotland is less than 4,000 tonnes). The Grimsby Telegraph [reported in February 2023](#):



Fish Farmer [reported in March 2023](#):

## Fish farm protest staged at Grimsby football match

By Vince McDonagh - 9th March 2023



The Ferret [reported in March 2023](#):



## **Environmental concerns**

Alongside concerns about Anderson's involvement in the proposed Grimsby project, there are also fears that it could harm animal welfare and the local environment.

If approved, the farm will produce 1,000 cubic metres of effluents – sewage and liquid waste – every day, and this will be discharged into the nearby Humber Estuary, which is designated as a special area of conservation and a site of special scientific interest.

AquaCultured says this effluent will be treated to “a very high standard” before it is discharged.

The project itself is proposed for a site which has been designated as a local wildlife site. Grimsby residents have claimed that the land there – a former railway siding – is home to families of deer, species of endangered butterfly, and migrating birds which will be displaced if the project goes ahead.

Meanwhile, animal welfare campaigners claimed that the proposed use of a recirculated aquaculture system (RAS) at the Grimsby farm means “fish welfare is likely to be poor”.

Dr Nick Palmer, head of Compassion in World Farming UK, told The Ferret that RAS systems “typically use very high stocking densities and confine fish to barren tanks devoid of environmental enrichment” meaning their behavioural needs are not met.

Palmer also pointed out that the salmon reared at in Grimsby will be given feed containing wild-caught fish.

“This practice puts additional pressure on our already overfished wild populations and impacts other wild animals that rely on those fish to survive,” said Palmer, who urged North East Lincolnshire council to reject the project.

“There are other environmental concerns too – RAS are energy intensive, and many systems also rely heavily on precious resources like freshwater. It is estimated that to produce one salmon fillet in a RAS system, it takes as much freshwater as one person would drink in a whole year.”

#### **Contact:**

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#### **Notes to Editors:**

[1] Find out more details of the protests in Cleethorpes and Grimsby [online here](#)

Read more about the controversial proposal for the UK’s largest salmon farm via:

[The Ferret: "Scots salmon boss accused of spying is key player in plan for 'UK's largest fish farm'"](#)

["Fish farm protest staged at Grimsby football match" \(Fish Farmer\)](#)

[Photos & Video from the protest vs the UK's largest salmon farm in Grimsby/Cleethorpes](#)

[Videos: BBC News on Protests vs Super-Sized Salmon Farm in Cleethorpes \(next to Grimsby FC\)](#)

[Residents Rail Vs UK's Largest Salmon Farm Planned for Grimsby/Cleethorpes](#)

[Protest Vs Grimsby Salmon Farm - Tuesday 7 March!](#)

[Cleethorpes Residents Go Wild for Nature \(not a stinky salmon farm\)!](#)

[BBC News: "Concerns over plans for £75m salmon farm in Cleethorpes"](#)

[Grimsby Telegraph: "Residents' fury at plan for £75m salmon farm in Cleethorpes"](#)

[Fishy Filings at Companies House Flush Out Owners of AquaCultured Seafood - including \\$almafia Spy Craig Anderson!](#)

[UK's Largest Salmon Farm Makes Splash in Trade Press!](#)

[Grim Warning over UK's Largest Salmon Farm - £75 million proposal to farm 5,000 tonnes of fish next to Grimsby FC spawns community backlash!](#)

Protests planned in Scotland – to coincide with the [Sustainable Aquaculture Summit in Glasgow](#) (16-17 May 2023) and [Aquaculture Awards in Inverness](#) (15 June 2023) – include the following land-based salmon farms:

Mowi: [Inchmore](#), [Inverpolly](#) & [Lochailort](#)

Scottish Sea Farms: [Barcaldine](#), [Girista](#) & [Knock](#)

Bakkafrost: [Applecross](#), [Couldoran](#) & [Kinlochmoidart](#)

Cooke Aquaculture: [Ardtaraig](#), [Cairndow](#) & [Furnace](#)

Hendrix Genetics (Landcatch): [Clachbreac](#), [Inverkerry](#) & [Ormsary](#)

AquaGen: [Holywood](#)

Other protests are planned in Chile, Ireland, New Zealand, France, the Faroe Islands, the United States, Canada and other countries during 2023 ([watch this space](#) for details).



Read more about the Real Salmon Farming Resistance via:  
[Global Resistance to All Salmon Farms – on land, in the sea & in freshwater!](#)